

CHAPTER 8

CONCRETE GRAVITY WALLS

8-1. General Factors. Factors favoring concrete gravity retaining walls are shallow depth of overburden, a competent foundation, and an adequate source of fine and coarse aggregate for the required volume of concrete. See Chapter 2, Section I for additional comments on gravity walls.

8-2. Foundation Investigation. The requirements for the foundation investigation are discussed in Chapter 2, Section V.

8-3. Materials. A concrete compressive strength of 2,000 to 2,500 psi will usually meet the requirements for the gravity type wall. Where the environment requires durability, such as at the outer surface of the wall, the higher strength should be achieved with the appropriate water-cement ratio from EM 1110-2-2000.

8-4. Design.

a. Magnitude and Distribution of Forces.

(1) Dead Load. The unit weight of concrete is usually assumed to be 150 lb/cu ft. This value may vary, depending on the aggregate. Other dead loads that should be considered are superimposed backfill and the weights of any equipment or other structures supported by the wall.

(2) External Water Pressure. The pressure exerted by water above ground and water in the ground should be determined as described in Section III of Chapter 3.

(3) Internal Water Pressure (uplift). The uplift on a lift (horizontal construction joint) within the body of a concrete gravity wall for long-term water levels should be taken as 50 percent of the value obtained by assuming a straight line variation between the full hydrostatic pressures acting on each side of the wall. Uplift pressures on the base of the wall should be determined by the methods described in Section III of Chapter 3.

(4) Lateral Earth Pressures. Lateral earth pressures should be determined by the methods presented in Section II of Chapter 3. Computation examples, as applied to gravity walls, are shown in examples 5, 6, 8, 10, and 11 of Appendix M.

(5) Wind and Earthquake Forces. These supplemental forces should be determined by the methods presented in Section IV of Chapter 3.

b. Load Cases. The load cases should be those described in Section I of Chapter 4.

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c. External Stability. Sliding and overturning stability should be determined by the methods and criteria discussed in Chapter 4. Computer program 3DSAD will significantly assist in performing stability analyses. An example of a complete stability analysis of a gravity wall section is shown in example 2 of Appendix N.

d. Internal Stability. The resultant of all forces acting on any horizontal section should fall within the kern or sufficiently close to the kern of the section to keep the tensile stresses low. See EM 1110-1-2101 for allowable concrete stresses.

e. Foundation Analyses. Foundation analyses should be performed in accordance with the methods described in Chapters 4 and 5.